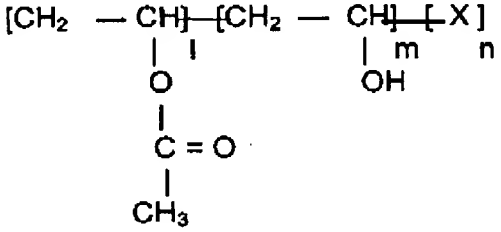
Amendments to the Claims

1. (Currently Amended) A hydrophilization agent for metallic material, comprising:

(A) a hydrophilic polymer having at least one non-ionic functional group selected from the group consisting of ~~[primary amide groups, secondary amide groups, tertiary amide groups,]~~ hydroxyl groups and polyoxyalkylene groups; said hydrophilic polymer consisting essentially of polyvinyl alcohol polymers of general formula I



(I),

reaction products of the polyvinyl alcohol polymers of general formula I with diketenes, and mixtures thereof, wherein X is a copolymerizing unit other than vinyl acetate and vinyl alcohol, l is the copolymerizing number of moles of a vinyl acetate copolymerizing unit, m is the copolymerizing number of moles of a vinyl alcohol polymerizing unit, and n is the copolymerizing number of moles of copolymerizing unit X, l and n may be zero;

(B) a hydrophilic polymer having at least one ionic functional group selected from the group consisting of sulfonic acid groups, phosphonic acid groups, carboxyl groups, primary amino groups, secondary amino groups, tertiary amino groups and quaternary ammonium groups;

(C) a vanadium compound; and

(D) a compound containing at least one element selected from the group consisting of Zr and Ti;

wherein said agent is free of chromium and alkali silicate.

2. (Canceled)

3. (Canceled)

4. (Canceled)

5. (Canceled)

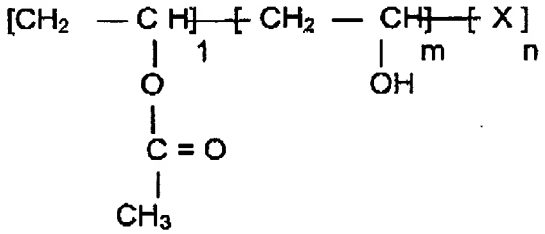
6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Canceled)

10. (Currently amended) A hydrophilization agent according to claim 1 wherein component (A) comprises at least one member selected from the group consisting of polyvinyl alcohol polymers of general formula I



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reaction products of the polyvinyl alcohol polymers of general formula I with diketenes, and mixtures thereof, wherein X is a copolymerizing unit other than vinyl acetate and vinyl alcohol, l is the copolymerizing number of moles of a vinyl acetate copolymerizing unit, m is the copolymerizing number of moles of a vinyl alcohol polymerizing unit, and n is the copolymerizing number of moles of copolymerizing unit X, and 1 and n may be

zero, wherein l is zero.

11. (Cancelled)

12. (Previously Presented) A hydrophilization agent according to claim 1, additionally comprising at least one additive selected from the group consisting of water, rust preventives, leveling agents, fillers, coloring agents, water-soluble solvents, anti-bacteria/mildew agents, organic crosslinking agents and surfactants.

13. (Previously Presented) A hydrophilization agent according to claim 1 comprising:

(i) 100 parts by weight component (A);

(ii) 0.1 to 1000 parts by weight component (B);

(iii) 0.1 to 200 parts by weight component (C); and

(iv) 0.1 to 200 parts by weight component (D).

14. (Previously Presented) A method of treating a surface of a metallic material comprising depositing the hydrophilization agent of claim 1 on said surface and drying the hydrophilization
agent deposited on said surface to form a hydrophilic film.

15. (Previously Presented) A metallic material having a surface with a hydrophilic film thereon, said hydrophilic film being formed by the method of claim 14.

16. (Previously Presented) The metallic material according to claim 15 wherein said metallic material is a heat exchanger.

17. (Previously Presented) A hydrophilization agent according to claim 1 comprising:

(i) 100 parts by weight component (A);

(ii) 1 to 100 parts by weight component (B);

(iii) 1 to 100 parts by weight component (C); and

(iv) 1 to 100 parts by weight component (D).

18. (Previously Presented) A hydrophilization agent according to claim 1 comprising solvent and:

(i) 0.05 to 50 g/L of component (A);

(ii) 0.05 to 50 g/L of component (B);

(iii) 0.05 to 10 g/L of component (C); and

(iv) 0.05 to 10 g/L of component (D).

19. (Previously Presented) A hydrophilization agent according to claim 1 comprising water and:

(i) 0.5 to 10 g/L of component (A);

(ii) 0.5 to 10 g/L of component (B);

(iii) 0.5 to 5 g/L of component (C); and

(iv) 0.5 to 5 g/L of component (D).

20. (Previously Presented) A hydrophilization agent in accordance with claim 10 wherein component (A) comprises at least one polyvinyl alcohol polymer of general formula I wherein copolymerizing unit X has a copolymerizing mole ratio n/1+m+n from 0 to 0.4.

21. (Previously Presented) A hydrophilization agent in accordance with claim 10 wherein component (A) comprises at least one polyvinyl alcohol polymer of general formula I wherein the vinyl acetate polymerizing unit has a copolymerizing mole ratio 1/1+m+n

from 0 to 0.2.

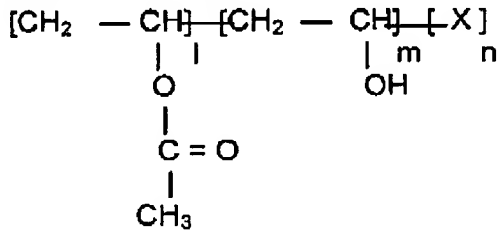
22. (Previously Presented) A hydrophilization agent in accordance with claim 11 wherein component (B) comprises at least one acrylamide polymer which does not have a cationic group but which does have at least one ionic functional group selected from the group consisting of sulfonic acid groups, phosphonic acid groups, and carboxyl groups.

23. (Previously Presented) A hydrophilization agent in accordance with claim 11 wherein component (B) comprises at least one acrylamide polymer which does not have an anionic group but which does have at least one member selected from the group consisting of primary amino groups, secondary amino groups, tertiary amino groups and quaternary ammonium groups.

24. (Previously Presented) A hydrophilization agent in accordance with claim 1 wherein component (D) is water-soluble or water-dispersible.

25. (Currently Amended) A hydrophilization agent obtained by combining with a solvent the following components:

(B) a hydrophilic polymer having at least one functional group selected from the group consisting of [~~primary amide groups, secondary amide groups, tertiary amide groups,~~] hydroxyl groups and polyoxyalkylene groups, said hydrophilic polymer consisting essentially of polyvinyl alcohol polymers of general formula I



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reaction products of the polyvinyl alcohol polymers of general formula I with diketenes, and mixtures thereof, wherein X is a copolymerizing unit other than vinyl acetate and vinyl alcohol, l is the copolymerizing number of moles of a vinyl acetate copolymerizing unit, m is the copolymerizing number of moles of a vinyl alcohol polymerizing unit, and n is the copolymerizing number of moles of copolymerizing unit X, l and n may be zero;

(C) a hydrophilic polymer having at least one ionic functional group selected from the group consisting of sulfonic acid groups, phosphonic acid groups, carboxyl groups, primary amino groups, secondary amino groups, tertiary amino groups and quaternary ammonium groups;

(D) a vanadium compound; and

(E) a compound containing at least one element selected from the group consisting of Zr and Ti;

wherein said agent is free of chromium and alkali silicate.

26. (Previously Presented) A hydrophilization agent in accordance with claim 25 wherein said solvent comprises water.

27. (Previously Presented) A hydrophilization agent in accordance with claim comprising:

(i) 0.05 to 50 g/L of component (A);
(ii) 0.05 to 50 g/L of component (B);
(iii) 0.05 to 10 g/L of component (C); and
(iv) 0.05 to 10 g/L of component (D).

28. (Previously Presented) A method in accordance with claim 14 wherein said surface is degreased prior to said depositing.

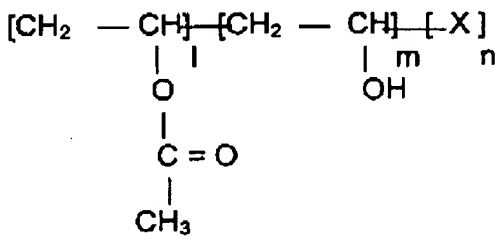
29. (Previously Presented) A method in accordance with claim 14 wherein said surface is pre-treated by chemical conversion prior to said depositing.

30. (Previously Presented) A method in accordance with claim 14 wherein said hydrophilic film has a thickness of from 0.05 µm to 5 µm.

Serial No. 09/807,658
Art Unit 1742

31. (Currently Amended) A metallic material having a surface with a hydrophilic film thereon, said hydrophilic film comprising:

(A) a hydrophilic polymer selected from the group consisting of polyvinyl alcohol polymers of general formula I



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reaction products of the polyvinyl alcohol polymers of general formula I with diketenes, and mixtures thereof, wherein X is a copolymerizing unit other than vinyl acetate and vinyl alcohol, l is the copolymerizing number of moles of a vinyl acetate copolymerizing unit, m is the copolymerizing number of moles of a vinyl alcohol polymerizing unit, and n is the copolymerizing number of moles of copolymerizing unit X, l and n may be zero, having at least one functional group selected from the group consisting of primary amide groups, secondary amide groups, tertiary amide groups, hydroxyl groups and polyoxyalkylene groups;

(B) a hydrophilic polymer having at least one ionic functional group selected from the group consisting of sulfonic acid groups, phosphonic acid groups, carboxyl groups, primary amino groups, secondary amino groups, tertiary amino groups and quaternary ammonium groups;

(C) a vanadium compound; and

(D) a compound containing at least one element selected from the group consisting of Zr and Ti;

wherein said agent is free of chromium and alkali silicate.

32. (Previously Presented) A metallic material in accordance with claim 31, wherein said metallic material is a heat exchanger.

33. (Previously Presented) A metallic material is accordance with claim 31, wherein said film has a thickness of from 0.05 μm to 5 μm.

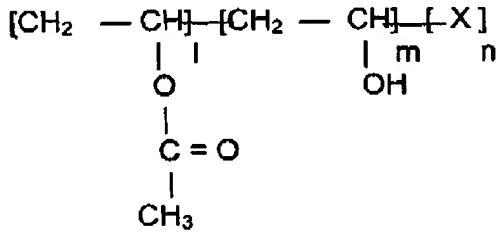
34. (Previously Presented) A metallic material in accordance with claim 31, wherein said film comprises:

(i) 100 parts by weight of component (A);
(ii) 0.1 to 1000 parts by weight of component (B);
(iii) 0.1 to 200 parts by weight of component (C); and
(iv) 0.1 to 200 parts by weight of component (D).

35. (Currently Amended) A hydrophilization agent for metallic material, consisting essentially of:

(A) a hydrophilic polymer having at least one non-ionic functional group selected from the group consisting of hydroxyl groups and polyoxyalkylene groups;
(B) a hydrophilic polymer having at least one ionic functional group selected from the group consisting of sulfonic acid groups, phosphonic acid groups, carboxyl groups, primary amino groups, secondary amino groups, tertiary amino groups and quaternary ammonium groups;
(C) a vanadium compound; and
(D) a compound containing at least one element selected from the group consisting of Zr and Ti ~~[Zr, Ti, and Si]~~.

36. (Previously Presented) A hydrophilization agent according to claim 35~~4~~ wherein component (A) comprises at least one member selected from the group consisting of polyvinyl alcohol polymers of general formula I



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reaction products of the polyvinyl alcohol polymers of general formula I with diketenes, and mixtures thereof, wherein X is a copolymerizing unit other than vinyl acetate and vinyl alcohol, l is the copolymerizing number of moles of a vinyl acetate copolymerizing unit, m is the copolymerizing number of moles of a vinyl alcohol polymerizing unit, and n is the copolymerizing number of moles of copolymerizing unit X, l and n may be zero and wherein copolymerizing unit X has a copolymerizing mole ratio n/l+m+n from 0 to 0.3.